2020 Highlights

The Hanford Site is located in south-central Washington State and encompasses approximately 581 mi^2 (1,505 km^2) in Benton, Franklin, Adams, and Grant Counties.

Cleanup of the Hanford Site is overseen by the U.S. Department of Energy, Richland Operations Office (DOE-RL) and Office of River Protection (DOE-ORP). The DOE-RL and the DOE-ORP manage the site through several contractors and their subcontractors.

The average temperature for 2020 was above normal with 11 months showing warmer temperatures and 1 month showing cooler temperatures. Precipitation and snowfall for 2020 were 57% and 37% of normal, respectively.

From 1989 through December 31, 2020, a total of 1,367 Tri-Party Agreement milestones were completed and 345 target dates were met. During 2020, 21 specific cleanup milestones were scheduled for completion; of those, 19 milestones were completed on time, 1 milestone was being disputed, 3 milestones were in negotiations, and 0 milestones were deleted. In addition, two target dates were met, two target dates were in negotiation, and zero target dates were deleted or disputed.

1.0 Introduction

JR Draper

From 1959 to 1970, a report was annually published titled Evaluation of Radionuclide Conditions in the Vicinity of Hanford. In 1970, the report was expanded to include topics on air and water pollution, among other areas of public interest, and began annually publishing the report under the name Hanford Site Environmental Report. The report has continued to be published annually, previous years are available at http://msa.hanford.gov/page.cfm/enviroreports. The calendar year 2020 report includes a description of the Hanford Site mission; compliance with applicable federal, state, and local environmental laws, regulations, permits, executive orders, and U.S. Department of Energy (DOE) policies and directives; and descriptions of summary data from environmental programs. The sections in this document include topics on:

- Site compliance with federal, state, and local environmental standards and requirements
- Site operations, including environmental restoration efforts and cleanup and closure activities
- Environmental management performance
- Environmental occurrences and responses
- Effluents and emissions from site facilities
- Results of onsite and offsite environmental and groundwater monitoring efforts
- Cultural and biological resource assessments.

Additional detail is provided in the appendices and descriptions of specific analytical and sampling methods used for 2020 monitoring efforts and are provided in the latest version of DOE/RL-91-50, *Hanford Site Environmental Monitoring Plan*.

Section 1.0 provides information about the Hanford Site location and details the environmental setting, mission, management, primary operations and activities, and climate and meteorology as well as stakeholder involvement, the role of regional Tribal governments, and Hanford Site regulatory oversight.

1.1 Hanford Site Location

The Hanford Site encompasses approximately 581 mi^2 (1,505 km^2) in Benton, Franklin, Adams, and Grant Counties, located in south-central Washington State within the semi-arid Pasco Basin of the Columbia Plateau (Figure 1-1). The Hanford Site stretches approximately 30 mi (50 km) north to south and about 24 mi (40 km) east to west, immediately north-northwest of the confluence of the Yakima and Columbia Rivers; the cities of Kennewick, Pasco, and Richland (the Tri-Cities); and the city of West Richland. The Columbia River flows 50 mi (80 km) through the northern part of the Hanford Site and, turning south, forms part of the Hanford Site's eastern boundary. Rattlesnake Mountain, Yakima Ridge, and Umtanum Ridge are on the southwestern and western boundaries of the Hanford Site and Saddle Mountain is on the northern boundary. The plateau of the central portion of the Hanford Site has two small east-west ridges: Gable Butte and Gable Mountain. Lands adjoining the Hanford Site to the west, north, and east are principally range and agricultural (WCH-520). With restricted public access, the diverse geographic features and land (Figure 1-2) provide a buffer for areas used for former nuclear materials production, research, and ongoing waste storage and disposal.

The climate of south-central Washington State is strongly influenced by the Pacific Ocean and the Cascade Range to the west. The Rocky Mountains to the east and the north are also an important influence on the climate of the region. Locally, the climate of the Hanford Site is influenced by the Yakima Ridge, Umtanum Ridge, Rattlesnake Hills (including Rattlesnake Mountain), and Horse Heaven Hills to the west and south and Saddle Mountain to the north. The relatively low annual average rainfall (6.3 in. [16 cm]) at the Hanford Site is caused in large part by the rain shadow created by the Cascade Range. Maritime influences are experienced in the Hanford Site area during the passage of strong, large-scale storm systems. Maritime air also penetrates into the region through gaps in the Cascade Range (such as the Columbia River Gorge).

Continental influences are limited by the mountain ranges to the north and east of the Hanford Site. These mountains play a key role in protecting the region from the more severe winter storms and the extremely low temperatures associated with the modified arctic air masses that move southward through Canada (WHC-SD-HWV-PSAR-001).

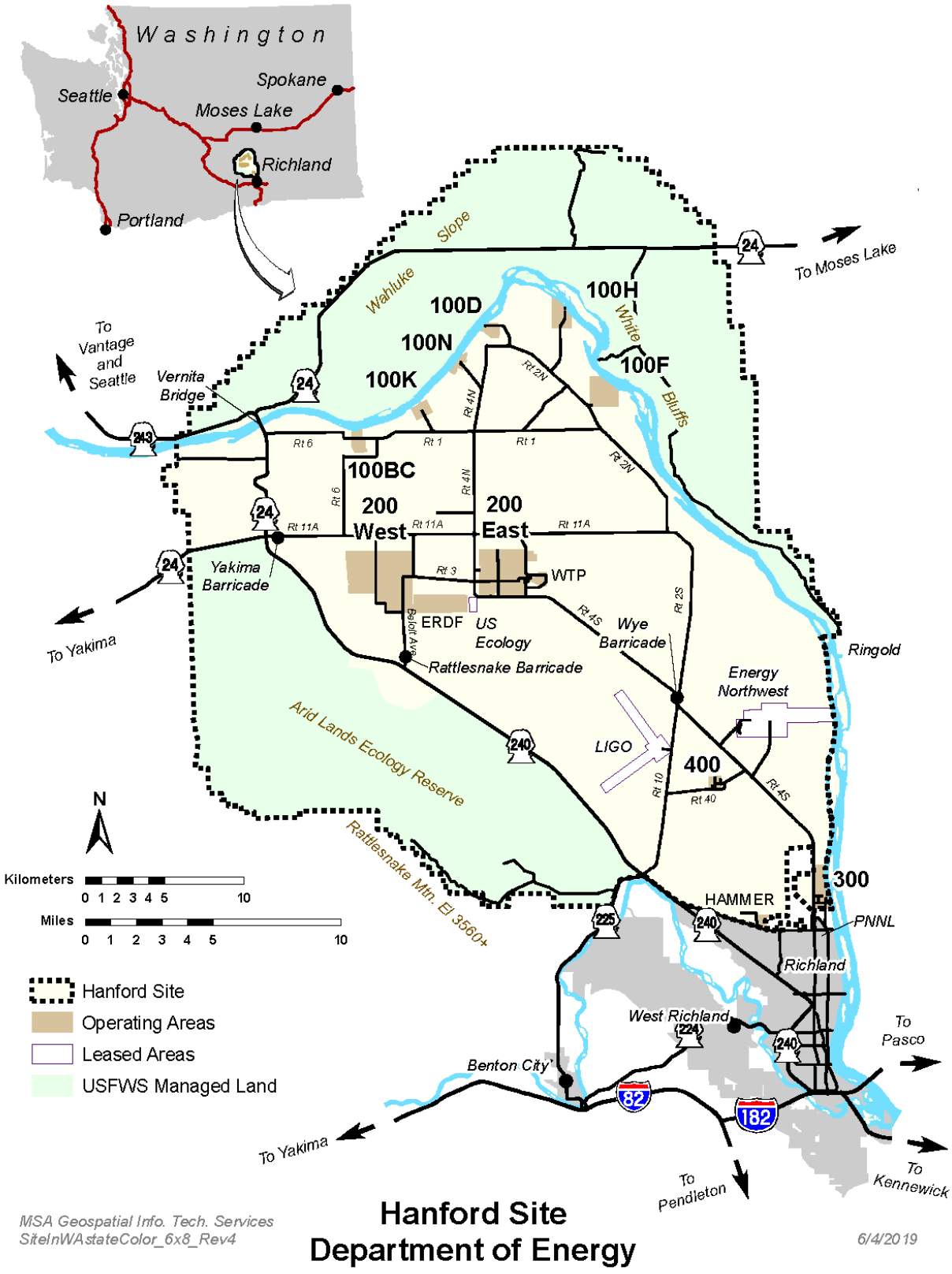

Figure 1-1. Location of the Hanford Site.

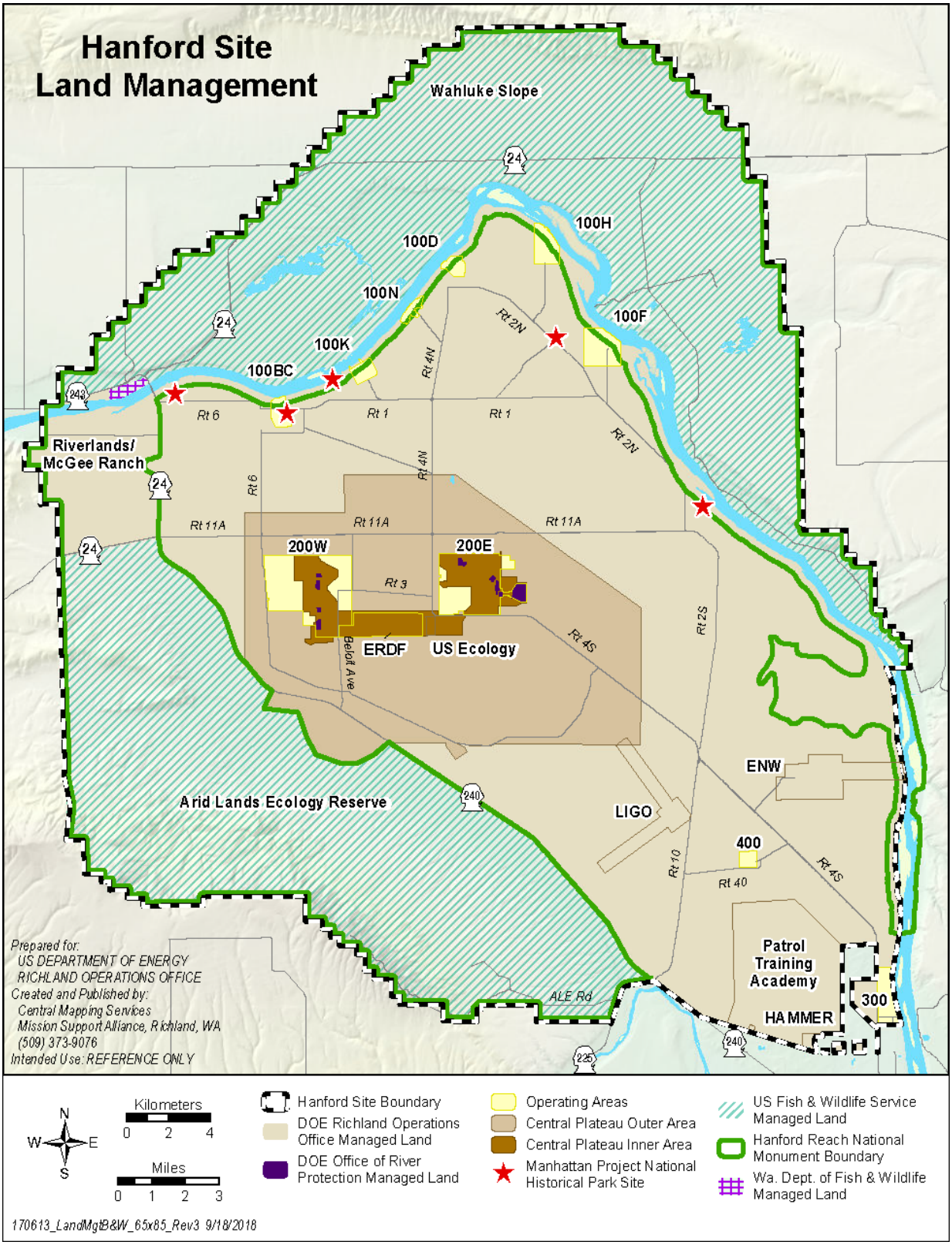

Figure 1-2. Detailed Geography of the Hanford Site, Hanford Reach National Monument, and U.S. Department of Energy Portions of the Hanford Site.

The Hanford Site lies within the interior, low elevation Columbia River Basin, which is within the shrub-steppe zone. The diversity of physical features across the Hanford Site contributes to a corresponding diversity of biological communities. The majority of the Hanford Site consists of shrub-steppe habitats; however, valuable riparian, wetland, and aquatic habitats are associated with the Hanford Reach of the Columbia River. The Hanford Site also contains a diversity of other rare terrestrial habitats such as riverine islands, bluffs/cliffs, basalt outcrops, swales, and sand dunes. Shrub-steppe, inland dunes, and riparian habitats are considered "priority habitats" by the Washington State Department of Fish and Wildlife (WDFW) (DOE/RL-96-32; WDFW 2008). Some of these areas contain species considered rare and/or declining, or are of significant interest to federal, state, or Tribal governments.

1.2 Hanford Site History and Mission

In February 1943, the federal government, under the authority of the *War Powers Act*, acquired 625 mi^2 (1,689 km^2) of the mid-Columbia basin for the Hanford Site, known as the Hanford Engineer Works during the Manhattan Project, and offered resident compensation. Approximately 1,500 people living in towns and on farms from Priest Rapids to Richland were ordered to leave their homes and property (Figure 1-3). In some cases, landowners had only 30 days to move (Harvey 2000). Construction of the Hanford Site began in 1943 and, over time, nine plutonium production reactors were built along the Columbia River, with one or more reactors operating from 1944 through 1987. Research reactors, including the Fast Flux Test Facility (FFTF) that operated from 1982 to 1992, were located in the southern portion of the Hanford Site. Hundreds of other supporting buildings and extensive infrastructure were constructed to support the program to provide plutonium to fuel atomic weapons during World War II and the Cold War and support research into nuclear energy. The Hanford Site manufactured the uranium metal fuel for the nuclear reactors onsite. Five chemical process plants in the center of the Hanford Site processed 110,000 tons (100,000 metric tons) of irradiated fuel from the reactors, discharging an estimated 450 billion gal (1.7 trillion L) of liquids to soil disposal sites and 54.1 million gal (204.8 million L) of radioactive waste to 177 large underground tanks.

Figure 1-3. Asparagus Planting at Ballygreen Farm, White Bluffs (circa 1911).

With the end of the Cold War and the signing of the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement [TPA]) in 1989 (Ecology et al. 1989) by the Washington State Department of Ecology (Ecology), U.S. Environmental Protection Agency (EPA), and DOE (collectively, TPA agencies), the mission focus shifted to developing new waste treatment and disposal technologies, characterizing and cleaning up the contamination from historical operations activities to environmental remediation. At Hanford, the DOE is responsible for one of the largest nuclear cleanup efforts in the world, managing the legacy of five decades of nuclear weapons production.

After nearly three decades of cleanup, considerable progress has been made at the Hanford Site, reducing risk to the health and safety of workers, the public, and the environment (Figure 1-4). Crews responsible for Hanford Site cleanup are dealing with several different kinds of waste in a number of different forms, with many of the wastes being potentially harmful to people and the environment. Precautions have been taken so that the waste does not contaminate the air, soil, groundwater, the Columbia River, the people who are doing the cleanup work, or the people and environment near the Hanford Site. The Hanford Site's current mission focuses on environmental restoration, which includes remediation of contaminated areas, decontamination and decommissioning of Hanford Site facilities, waste management (i.e., waste storage, treatment, and disposal), related scientific and environmental research, and development of waste management technologies. In addition, the Manhattan Project National Historical Park, of which the B Reactor and other Hanford Site structures are a part, focuses on historic preservation and public education.

Figure 1-4. Aerial View of 100-D and DR Reactors. The 100-D Reactor was the World's Second Full-Scale Reactor. It Became Operational in 1944 and Ran Until 1967. It Was Cocooned in 2004.

1.3 Primary Operations and Activities

The following is a list of the major DOE operational, administrative, research, and historically preserved areas in and around the Hanford Site.

1.3.1 100 Area

The 100 Area occupies 4 mi^2 (11 km^2) and consists of six sites (100-B/C, 100-D/DR, 100-F, 100-H, 100-KE/KW, and 100-N) along the Columbia River shore in the northern portion of the Hanford Site. These sites were the location of the nine nuclear reactors built between 1943 and 1963. They were constructed next to the river because of cooling water needed by the reactors during operation. None of the Hanford Site DOE reactors are in operation any more with the last reactor, the FFTF Reactor, being shut down in 1992. A public utility, Energy Northwest, continues to operate a commercial Nuclear Regulatory Commission-licensed reactor on Hanford-leased land near the sand dunes along the Columbia River.

Beginning in the 1990s, workers began the process of cocooning the DOE reactors. When a reactor is cocooned about 80% of the buildings and auxiliary structures that were needed to support the reactor during its operating days are demolished and removed. The remaining 20% of the reactor complex, including the core of the reactor itself, is enclosed in a cement and steel structure called a cocoon. This cocoon prevents radiation or contamination left over from nuclear operations from escaping to the environment. Ultimately, 8 of the 9 reactors in Hanford's 100 Area will be cocooned. Reactors C, D, DR, F, H, and N are already cocooned, with K-East and K-West Reactors next in line to be cocooned. B Reactor will not be cocooned. It has been named a National Historic Landmark by the United States Department of the Interior and has been preserved as a museum. In 2015 B Reactor was included in the Manhattan Project National Historic Park, consisting of historic facilities at Hanford, Los Alamos, and Oak Ridge. As the first industrial-scale nuclear reactor, B Reactor produced plutonium for the world's first nuclear detonation (Trinity Test) and the atomic bomb that was detonated over Nagasaki, Japan, in 1945. Every 10 years, Hanford Site crews enter the cocooned reactors (also termed Safe Storage Enclosures) to ensure they are maintained in a safe, environmentally secure, and cost-effective manner until subsequent closure during the final disposition phase of decommissioning. The next series of inspections are planned for the year 2025. These Safe Storage Enclosures will remain in place for approximately 75 years.

DOE operates five pump-and-treat facilities along the River Corridorin the operable unit areas to intercept and treat contaminated groundwater plumes before they enter the river (Figure 1-5). The KR4 system was the first system installed and began operation in 1997. The KR4 pump-and-treat system treats groundwater downgradient from the 116-K-2 Trench and treats up to 330 gal/min (1,249 L/min). The KW system was the second system installed; it began remediating hexavalent chromium in the KW Reactor area in January 2007 and treats up to 330 gal/min (1,249 L/min). The third and newest system (KX) began operation in February 2009 and treats up to 900 gal/min (3,407 L/min). The KX system is used primarily to treat hexavalent chromium in groundwater in KE and near N Reactor Area. The DX and HX pump-and-treat systems were designed for hydraulic control and hexavalent chromium mass removal to protect the Columbia River in the HR Operable Unit. Both the DX and HX pump-and-treat systems include an extraction well network, transfer building (the DX system has two transfer buildings), a treatment building, and injection well network. The DX system was fully operational in December 2010 and the HX system was fully operational in October 2011. The DX and HX systems are designed to provide treatment capacities of up to 900 gal/min (3,407 L/min) each. Details of the operations and results for these pump-and-treat facilities can be found in DOE/RL-2019-67, *Calendar Year 2019 Annual*

Summary Report for the 100-HR-3 And 100-KR-4 Pump and Treat Operations, and 100-NR-2 Groundwater Remediation.

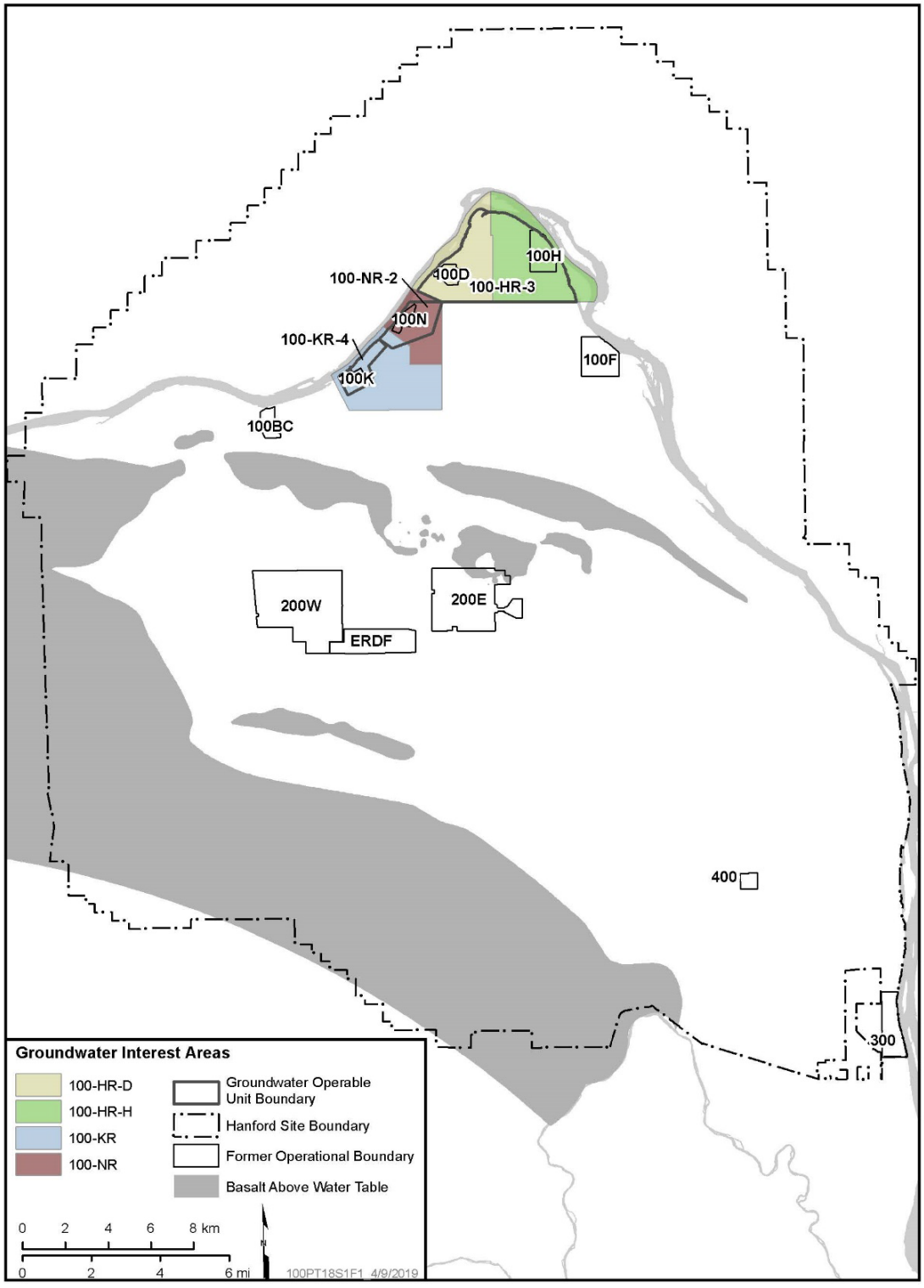

Figure 1-5. Location of Operable Units along the River Corridor.

1.3.2 200 Areas

The 200 Areas at the Hanford Site are known collectively as the Central Plateau. It is the part of the DOE Industrial Hanford Site that is the highest in elevation. There are three regions associated with the 200 Areas (the 200-East Area, the 200-West Area, and the 200-North Area); each are separated from each other by several miles. The 200 Areas make up about 75 mi^2 (194 km^2) of the Hanford Site. The plateau surface is approximately 328 ft (100 m) above the level of the Columbia River and about 280 ft (85 m) above the underlying water table. The 200 Areas contain underground waste storage tanks and housed facilities known as separations plants that extracted plutonium from dissolved irradiated fuel. Some of the most hazardous chemical and nuclear wastes were put into 177 underground storage tanks spread out into 18 groups of tanks called tank farms. The storage tanks range in size from 50,000 gal (190,000 L) of capacity to more than 1 million gal (3.8 million L) of capacity. Currently at the Hanford Site, some 54.1 million gal (204.8 million L) of chemical and nuclear waste remain stored in these tanks (HNF-EP-0182).

While much of the Hanford Site's current mission revolves around the demolition of buildings and facilities, there are two construction projects underway in the 200 Areas that are critical to the safe removal of the solid and liquid wastes at the Hanford Site. The Hanford Tank Waste Treatment and Immobilization Plant (WTP) is being built to process the millions of gallons of high-level waste. The process is called vitrification, where the liquid wastes are mixed with glass-making materials and then heated to form a red-hot, molten substance that is poured into steel cylinders. Once the material is cooled, the waste will have been captured in a glass form that is considerably more stable than liquid wastes are. These cylinders of vitrified waste will ultimately be sent to the National Repository where they will be buried permanently in a specially approved and regulated facility. The WTP site spans 65 ac (26 ha) and includes four major nuclear facilities – Pretreatment, Low-Activity Waste Vitrification, High-Level Waste Vitrification, and the Analytical Laboratory. The Environmental Restoration Disposal Facility (ERDF) also is located on the Central Plateau between the 200-East and -West Areas. ERDF is a massive landfill that is regulated by the EPA. ERDF accepts materials that come from building demolition projects and waste site remediation at the Hanford Site. The ERDF has been in operation for over 20 years.

The 222-S Analytical Laboratory plays many roles that include testing of waste compatibility and physical characteristics to support tank-to-tank waste transfers, performing corrosion rate studies and chemical testing to support tank corrosion inhibition, and providing input to the engineering specifications for each of the 242-A Evaporator campaigns. The laboratory also studies the physical and chemical characteristics of waste necessary to enable waste retrievals, provides data to support tank closure requirements, and supports the Vadose Zone Program.

The 242-A Evaporator is currently the only operating nuclear waste processing facility at the Hanford Site. The Evaporator receives mixed wastes that are pumped through underground pipes from double-shell waste storage tanks on the Hanford Site. The mission of 242-A is to take that waste, referred to as feed, and boil off as much of the liquids as possible. The remaining waste goes back into the waste storage tanks while the processed water is sent to other facilities for treatment and safe disposal.

The Canister Storage Building (CSB) is a large 42,000-ft^2 (3,902-m^2) facility in the Hanford Site's 200-East Area. The CSB stores about 2,300 tons of spent nuclear fuel packaged in approximately 400 multi-canister overpacks (MCOs). The MCOs are stored in 220 carbon steel tubes within a below grade

concrete vault. The MCOs will be safely stored in the tubes until they are removed for shipment to and permanent placement in the National Repository.

Adjacent to the CSB is the Interim Storage Area, which also contains spent nuclear fuel packaged in various containers. This spent nuclear fuel will be subsequently repackaged and will also be sent to the National Repository.

The 200-West Pump-and-Treat facility was constructed between 2010 and 2011 to remove contaminants of concern found in the Central Plateau groundwater. The 200-West pump-and-treat system is designed to treat contaminated groundwater and reduce the mass of carbon tetrachloride, total chromium (trivalent and hexavalent), nitrate, trichloroethene, technetium-99, and uranium. Following treatment, the water is re-injected into the aquifer to serve as a recharge source to promote flow-path control and provide hydraulic containment. The central facility can treat up to 2,500 gal/min (9,463 L/min) of extracted groundwater using two parallel treatment trains. The extraction and injection well network is located throughout the Central Plateau.

1.3.3 300 Area

The 300 Area is located just north of Richland and covers approximately 0.6 mi^2 (1.5 km^2). From the early 1940s until the start of the environmental cleanup mission in 1989, hundreds of thousands of tons of raw uranium was sent to the 300 Area to be manufactured into fuel assemblies called “rods.” These fuel rods were ultimately placed into the 100 Area reactors where a nuclear chain reaction would change the nuclear properties of the uranium into the plutonium needed for atomic weapons. The 300 Area also served to provide scientists with the laboratory facilities where they could test their theories and conduct experiments on the most efficient ways to transform the uranium into plutonium and perform materials analysis and research. Several small nuclear reactors were operated in the 300 Area in support of research. Due to the many experiments that were conducted at the 300 Area, there are several areas of contamination. The Pacific Northwest National Laboratory (PNNL), working for the DOE Office of Science’s Pacific Northwest Site Office, uses some of the buildings within the 300 Area under an agreement between the U.S. Department of Energy, Richland Operations Office (DOE-RL) and the Pacific Northwest Site Office.

1.3.4 400 Area

The 400 Area is located northwest of the 300 Area and covers approximately 0.23 mi^2 (0.61 km^2). This area includes the FFTF, the Maintenance and Storage Facility, and the Fuels and Materials Examination Facility (FMEF). Construction of FFTF was completed in 1978 and initial criticality was achieved in early 1980, with full power initiated in late 1980. Following an additional year of acceptance testing, FFTF operated successfully from 1982 to 1992 as a research facility providing the nuclear industry with advances in nuclear fuels, materials, and components; nuclear power plant operations and maintenance protocols; and reactor safety designs. During this time, FFTF also produced a wide variety of medical and industrial isotopes, made hydrogen-3 (tritium) for the U.S. fusion research program, and conducted cooperative international research work. In late 1993, DOE decided not to continue operating FFTF due to a lack of economically-viable missions at that time and issued a shutdown (e.g., deactivation) order for the facility. Since that time, and after various delays temporarily stopping the deactivation work, FFTF completed deactivation activities and was placed in a long-term, low-cost surveillance and maintenance condition in 2009. The Maintenance and Storage Facility is periodically used to support mock ups of proposed work to ensure the workers have practiced using the tools and equipment in physical configurations they are likely to encounter doing specialized work. The FMEF was intended to be a support building for the FFTF and the future Liquid Fast-Breeder Reactor Program; the FMEF was

never used in a nuclear capacity. When the nation abandoned the breeder reactor program, FMEF was also left without a mission and remains unused and largely vacant today.

1.3.5 600 Area

The 600 Area consists of the remainder of the Hanford Site and includes the Site's roads, railroads, fire station, an old concrete batch plant site, the former townsites of Hanford and White Bluffs, the Hanford Site meteorology station, the Wahluke Slope, and the Arid Lands Ecology Reserve (including Rattlesnake Mountain).

An area along the river and north of the 300 Area is leased by Energy Northwest for operation of a commercial nuclear plant called the Columbia Generating Station (CGS). CGS is the only commercial nuclear energy facility in the region. Construction of the CGS began in 1973 and power was first delivered to the region in 1984.

The 618-10 and 618-11 Burial Grounds are also located within the 600 Area. The burial grounds received wastes that were generated by activities in the 300 Area of the Hanford Site. The 300 Area included developing and manufacturing reactor fuel and conducting laboratory research during the Hanford Site's plutonium production mission. Some of the most hazardous wastes on the Hanford Site were disposed of in the 618-10 and 618-11 Burial Grounds. Cleanup of the 618-10 Burial Ground included remediating more than 2,200 drums, debris, and 94 buried vertical pipe units (VPU) that contain radioactive and chemical waste. The VPUs were either 55-gal (208-L) steel drums welded together end-to-end to form a pipe, or corrugated steel pipes. Waste disposed in the VPUs was packaged in a variety of containers ranging in size from juice cans to paint buckets. Remediation of the 618-10 Burial Ground was completed at the end of fiscal year (FY) 2017. Nonintrusive characterization of the 618-11 Burial Ground was completed in 2011.

1.3.6 1100 Area

The former 1100 Area is located between the 300 Area and Richland, covering 1.2 mi^2 (3.1 km^2). It had no disposal locations for radioactive or mixed wastes but contained several sites for hazardous wastes (e.g., batteries and battery acid containing lead, sulfuric acid, and ethylene glycol or antifreeze). Following cleanup, EPA took the site off the National Priorities List in 1996. In October 1998, this area was transferred to the Port of Benton as part of DOE's economic diversification efforts. While this area is no longer part of the Hanford Site, DOE contractors continue to lease facilities in this area.

1.3.7 3000 Area

The former 3000 Area is located northeast of the 1100 Area and accommodated engineering and construction support facilities. This area was used by the engineer/construction contractor for general office space, warehousing, and shops. The research and development contractor had several privately-owned laboratory facilities located here. The area also included part of the City of Richland.

1.3.8 Richland North Area (Offsite)

This area includes the DOE and DOE contractor facilities located between the 300 Area and the City of Richland that are not in the 1100 and 3000 Areas. Located in the Richland North Area is PNNL, a DOE National Laboratory operated by Battelle for DOE's Office of Science. PNNL conducts research for national security missions, nuclear materials stewardship, non-proliferation missions, the nuclear fuel life cycle, an energy production, and includes the DOE scientific user facility Environmental Molecular Sciences Laboratory. PNNL also supports the Hanford Site cleanup and River Corridor protection missions.

1.3.9 700 Area (Offsite)

The 700 Area of the Hanford Site is located in downtown Richland. Called the Federal Building, DOE and Site contractors occupy offices in the seven-story structure, although the majority of DOE offices are now located in the Stevens Center in North Richland near where the 1100 Area used to be located.

1.3.10 Volpentest Hazardous Materials Management and Emergency Response Federal Training Center

The Volpentest Hazardous Materials Management and Emergency Response (HAMMER) Federal Training Center is a worker safety training facility and is used by Hanford Site contractors, federal and state agencies, Tribal governments, and private industry. HAMMER is owned by DOE and operated by Mission Support Alliance, LLC (MSA). HAMMER is comprised of modern classrooms, specialty-training areas, and numerous life-size training props that can be configured to create a variety of situations for industrial hazards (e.g., worksite scenarios, emergency response or incident command, and hazardous materials training) (Figure 1-6). HAMMER contracts with emergency response agencies and offers classes in fire suppression, hostage rescue, high-speed pursuit, and drug enforcement. The facility consists of a 0.12-mi^2 (0.31-km^2) main site and a 15.6-mi^2 (40.4-km^2) law enforcement and security training site.

HAMMER staff manages nationally recognized training and safety programs including:

- Construction Worker Safety Training
- Worker-Trainer Program
- National Training Center Safety and Health Courses
- Energy Infrastructure Protection and Emergency Response Program
- Domestic and International Border Security Training
- Military Training.

Figure 1-6. Workers go Through a Decontamination Line as Part of a 40-hour Hazardous Waste Training Course.

1.3.11 Hanford Tank Waste Treatment and Immobilization Plant

Bechtel National, Inc. is designing, constructing, and commissioning the world's largest radioactive waste treatment plant for the DOE. When complete, the WTP, also known as the Vit Plant, will process and stabilize 54.1 million gal (204.8 million L) of radioactive and chemical waste currently stored at the Hanford Site. The construction site spans 65 ac (26 ha) and includes four major nuclear facilities – Pretreatment, Low-Activity Waste Vitrification, High-Level Waste Vitrification, and the Analytical Laboratory. The plant will use vitrification technology to stabilize the waste. Vitrification involves blending the waste with glass-forming materials and heating it to 2,100 °F (1,149 °C). The molten mixture is poured into stainless steel canisters to cool and solidify. In this glass form, the waste is stable in the environment and designed so the radioactivity will safely decay over hundreds to thousands of years.

1.3.12 Non-DOE Operations and Activities on Hanford Site-Leased Land

Energy Northwest operates a commercial nuclear power reactor called the CGS. It is located north of the 300 Area on 1,090 ac (440 ha) of leased land. The CGS nuclear facility is the third largest electricity generator in Washington State and the only commercial nuclear energy facility in the region. Construction of the CGS began in 1973 and power was first delivered to the region in 1984. All of its output is provided to the Bonneville Power Administration at the cost of production under a formal net billing agreement in which Bonneville Power Administration pays the costs of maintaining and operating the facility.

The U.S. Ecology Washington operates a commercial low-level radioactive waste (LLRW) burial site located west of the 200-East Area on 99 ac (40 ha) of leased land. The burial site serves commercial and government LLRW customers in the Northwest and Rocky Mountain compact regions: Alaska, Hawaii, Idaho, Montana, Oregon, Utah, Washington, Wyoming, Colorado, Nevada, and New Mexico.

The Laser Interferometer Gravitational-wave Observatory (LIGO) is located just north of the 400 Area and is designed to detect gravitational waves originating from mergers of black holes and other astronomical phenomena. LIGO is a scientific collaboration of the California Institute of Technology and the Massachusetts Institute of Technology funded by the National Science Foundation.

1.3.13 Non-DOE Nuclear Operations

The Perma-Fix Northwest Richland facility is a commercial treatment, storage, and disposal (TSD) facility located on 35 ac (14 ha) adjacent to the DOE Hanford Site. This facility receives, manages, and treats both LLRW and mixed LLRWs from the Hanford Site as well as other facilities across the United States. The facility can be used for a variety of fabrication projects, chemical mixing, maintenance, repair of hot equipment, and laboratory testing.

1.3.14 Hanford Reach National Monument

Designated in June 2000 by Presidential Proclamation (65 FR 37253), the Hanford Reach National Monument (Figure 1-2) covers 195,000 ac (78,900 ha) in Benton, Franklin, Grant, and Adams Counties. The purpose of the monument is to protect the nation's only non-impounded stretch of the Columbia River upstream of Bonneville Dam and the remaining shrub-steppe ecosystem that once blanketed the Columbia River Basin. The monument is divided into five administrative units: Rattlesnake (Fitzner/Eberhardt Arid Lands Ecology Reserve), Columbia River Corridor, Ringold, Wahluke, and Saddle Mountain. The U.S. Fish and Wildlife Service (USFWS), WDFW, and DOE-RL manage portions of the monument. The DOE-RL oversees a 14-mi^2 (36.4-km^2) area of the monument north and west of State

Highway 24 and south of the Columbia River in Benton County known as McGee Ranch/Riverlands. DOE also manages the River Corridor unit, which includes Hanford Reach islands (Benton County) and a 0.25-mi (0.4-km) wide strip of land along the Hanford Reach south and west shorelines from Vernita Bridge to north of the 300 Area. This 39-mi^2 (101-km^2) area in Benton, Franklin, and Grant counties also includes the 9.9-mi^2 (25.6-km^2) Hanford Site dunes north of the CGS.

1.3.15 Manhattan Project National Historical Park

Established in November 2015, The Manhattan Project National Historic Park is located in three areas of the United States (Oak Ridge, Tennessee; Los Alamos, New Mexico; and Hanford, Washington). These areas played critical roles in the research and development of the first nuclear bombs used in World War II. These sites were also at the origin of developing the national laboratory system that has given rise to U.S. scientific and technological advancement and capabilities. Key structures on the Hanford Site that are part of the permanently preserved park include:

- Bruggemann's Agricultural Warehouse Complex (existed since circa 1900–1943) – The last remaining building from an irrigated farm, orchard, and fruit packing and shipping facility.
- B Reactor National Historic Landmark – The B Reactor was the world's first full-scale plutonium production reactor.
- Allard (Hanford Irrigation District) Pump House (ca. 1908) – The pump house supplied Columbia River water to famers for irrigation.
- First Bank of White Bluffs (ca. 1907–1909) – The first European-American settlement of the late 1800s, White Bluffs was located in what was known as Washington territory. The bank represents the last remaining building of the pre-World War II town.
- Historic Hanford High School (ca. 1916) – The building served two generations of Hanford students and doubled as a hall for public meetings and social events.

These historical buildings represent some of the only remaining evidence of the agricultural towns of Hanford and White Bluffs and offer insight into the initial original settlement of the American West.

1.4 Hanford Site Management

Cleanup of the Hanford Site is overseen by two DOE offices, the DOE-RL and the U.S. Department of Energy, Office of River Protection (DOE-ORP). The DOE-RL and DOE-ORP manage the site through several contractors and their subcontractors. Each contractor is responsible for the safe and environmentally sound maintenance of activities or facilities, waste management, evaluation and determination of all discharges to the environment, and for monitoring any potential effluent to ensure environmental regulatory compliance. DOE, USFWS, and WDFW each manage portions of the Hanford Reach National Monument, as described above. The Manhattan Project National Historical Park is a partnership between DOE, with existing and continuing oversight and management of multiple locations (including the Hanford Site), and the U.S. Department of the Interior's National Park Service, acting as interpreter and offering visitor services and assistance with historical preservation.

The DOE-RL is the Hanford Site property owner and oversees cleanup along the Columbia River and the Central Plateau, including groundwater and waste site cleanup; management of solid waste, spent nuclear fuel, and sludge; facility cleanout, deactivation, and demolition; environmental restoration; plutonium management; and all site support services. The following is a list of DOE-RL's principal contractors and their respective responsibilities:

- MSA was awarded the Mission Support Contract for the Hanford Site in 2009. MSA is a joint venture between Leidos and Centerra Group as well as several partners with specialized Hanford Site expertise. MSA is responsible for site infrastructure services for the Hanford Site Cleanup mission including, but not limited to, roads and transportation services; electrical and water services; facility maintenance; emergency response (fire and patrol) services; network and software engineering; cyber security and records management; and environmental compliance and clean energy solutions.

- CH2M Hill Plateau Remediation Company (CHPRC) was awarded the Plateau Remediation Contract in 2008. CHPRC is responsible for the safe environmental cleanup of the Central Plateau at the Hanford Site, including waste retrieval and fuels management, groundwater and vadose zone remediation, demolition of facilities and canyons, closure of the Plutonium Finishing Plant, and remediation of the 100-K Area along the Columbia River, which includes preparing for treatment of highly radioactive sludge that is now in the K-West Basin where it will be stored until it can be treated.

- HPMC Occupational Medical Services (HPMC) was awarded the occupational medical contract for the Hanford Site in 2012. HPMC is responsible for the health and safety needs of more than 8,000 Hanford Site workers. Besides providing medical monitoring and qualification-for-work exams, services also include operating and maintaining two clinical facilities, epidemiological studies of Hanford Site workers, and maintenance of the medical records of Hanford Site workers.

The DOE-ORP was established by Congress in 1998 as a field office to manage the retrieval, treatment, and disposal of approximately 54.1 million gal (204.8 million L) of radioactive tank waste currently stored in 177 underground tanks in the central part of the site. The tank waste is material left over from years of World War II and post-war production of nuclear weapons fuel. In support of this mission, DOE-ORP is responsible for the safe operation of the tank farms and 200 Area facilities, and construction and operation of the WTP located in the Central Plateau. The following is a list of DOE-ORP's principal contractors and their responsibilities at the Hanford Site.

- Wastren Advantage, Inc. was awarded the Laboratory Analytical and Testing Services contract in 2014. Wastren operates, manages, and maintains the Analytical Services functions of the Hanford Site's 222-S Laboratory. Technicians test some 25,000 samples of materials that come in from numerous projects on the Hanford Site.

- Bechtel National, Inc. was awarded the contract to design, construct, and commission the WTP in 2000. When complete, the WTP will process and stabilize radioactive and chemical waste currently stored at the Hanford Site. The WTP will cover 65 ac (26 ha) with four nuclear facilities (Pretreatment, High-Level Waste Vitrification, Low-Activity Waste Vitrification, and an Analytical Laboratory), as well as operations and maintenance buildings, utilities, and office space.

- Washington River Protection Solutions, LLC (WRPS) was awarded the Tank Operations Contract in 2008. It is WRPS' responsibility to maintain and operate the Tank Farms, 242-A Evaporator, Effluent

Treatment Facility/Liquid Effluent Treatment Facility, and supporting Tank Farm infrastructure as well as operate the 222-S Laboratory. WRPS is owned by AECOM and Atkins with AREVA as the primary subcontractor. WRPS is responsible for safely managing the underground waste storage tanks and preparing the systems to feed waste to the WTP for immobilization. The waste is stored in 149 single-shell tanks and 28 double-shell tanks located in the 200 Areas. The 242-A Evaporator is located in the 200-East Area of the Hanford Site and is critical to the safe management of Hanford's tank waste. It began operating in 1977 to reduce the volume of waste stored in the Hanford Site's underground tanks.

The DOE Office of Science manages DOE's science and technology programs, goals, and objectives at PNNL. DOE chartered the Pacific Northwest Site Office to oversee the operation of PNNL, operated by Battelle Memorial Institute since 1965. As 1 of 10 DOE national laboratories, PNNL is responsible for conducting research and delivering scientific solutions from multiple scientific disciplines to solve energy, environmental, and national security challenges. PNNL supports not only DOE but also the U.S. Department of Homeland Security; National Nuclear Security Administration; and other government agencies, universities, and industries. PNNL is home to DOE's Environmental Molecular Sciences Laboratory, a national scientific user facility leading molecular-level discoveries for DOE's Office of Biological and Environmental Research.

1.5 Fire Protection and Management

RL Hibbs

Following the DOE complex-wide fires of 2000, DOE Headquarters instituted a short moratorium on prescribed burning. In May 2001, field offices were granted approval authority for specific prescribed fire plans. Prescribed fire plans are designed to address areas along designated fire breaks that need improvement and accumulations of biomass fuels (e.g., tumbleweeds). In addition to fire break maintenance and fuel reduction, prescribed fire can be a valuable and cost-effective tool for the ecosystem and the mitigation of noxious/invasive plant species.

The Hanford Fire Department vigorously pursues compliance, as directed by DOE, with all applicable environmental compliance regulations. Included in HNF-44199, *Hanford Fire Department 2020 Prescribed Fire Plan,* are technical data for use by appropriate personnel for decision making in the fire environment with respect to prescribed fire application. The purpose of each prescribed fire plan is to identify specific accomplishable objectives and to ensure compliance for each type of fire application.

Site-specific burn plans are prepared in support of each application of prescribed fire. Prior to conducting prescribed burning, in accordance with approved plans, burn permits must be in place and *National Environmental Policy Act of 1969* (NEPA) documentation (including cultural and ecological resource reviews) must be completed.

In addition, the requirements for other applicable regulations must be followed pursuant to existing procedures (e.g., *Clean Air Act*, *Clean Water Act*). Each burn plan uses a Specific, Measurable, Achievable, Realistic, and Time framework that is applied to all portions of the burn plan in order to ensure that fire application is appropriate.

Detailed information on Hanford Fire Department's prescribed burning activities is available in HNF-44199, *Hanford Fire Department 2020 Prescribed Fire Plan.*

1.6 Climate and Meteorology

GE Gutierrez, PJ Perrault

The Hanford Meteorology Station is located on the Hanford Site's Central Plateau. Meteorologists take meteorological measurements to support Hanford Site operations, emergency preparedness and response, and atmospheric dispersion calculations for dose assessments. Support is provided through weather forecasting and by maintaining and distributing meteorological and climatological data. This data is used by a broad range of scientific and clean-up endeavors across the Hanford Site. Forecasting is provided to help manage weather-dependent operations. Climatological data are provided to help plan weather-dependent activities and to assess the environmental effects of the Hanford Site operations.

Hanford Meteorology Station staff members rely on data provided by the Hanford Meteorological Monitoring Network, which consists of 29 remote monitoring stations that transmit data to the Hanford Meteorology Station through radio telemetry every 15 minutes. There are 3 towers that are 10 ft (3 m) high, 22 towers that are 30 ft (9 m) high, 3 towers that are 200 ft (61 m) high, and 1 tower that is 400 ft (121 m) high. Meteorological information collected at these stations includes wind speed, wind direction, temperature, precipitation, atmospheric pressure, dewpoint temperature, wet-bulb global temperature, solar radiation, relative humidity, and subsurface soil temperature; however, not all data are collected at all stations. Other specialized meteorological data such as cloud height, visibility, present weather, and freezing rain detection is collected at select sites.

Regional temperatures, precipitation, and winds are affected by mountain barriers. Beyond the city of Yakima to the northwest, the Cascade Mountain Range greatly influences the climate of the Hanford Site because of its rain-shadow effect. The Rocky Mountains and mountain ranges in southern British Columbia, Canada, protect the region from severe, cold polar air masses moving southward across Canada and winter storms associated with them.

Prevailing wind direction on the Central Plateau is from the northwest all year long, with a secondary wind from the southwest. Summaries of wind directions indicate that winds from the northwestern quadrant occur most often during winter and summer. During spring and fall, the frequency of southwesterly winds increases with a corresponding decrease in the northwesterly flow. Monthly wind speeds are lowest during winter months, averaging about 6 to 7 mph (3 m/s), and highest during summer, averaging about 8 to 9 mph (4 m/s). Wind speeds well above average are usually associated with southwesterly winds. However, summer drainage winds are generally northwesterly and frequently exceed 30 mph (13 m/s). These winds are most prevalent over the northern portion of the Hanford Site. Figure 1-7 shows the 2020 wind roses, diagrams showing direction and frequencies of wind, measured at a height of 30 ft (9 m) for 28 meteorological monitoring stations. Note: Stations 19, 29, and 32 are 10 ft (3 m) tall, leading to small changes in wind data, due to greater friction with the ground at lower levels.

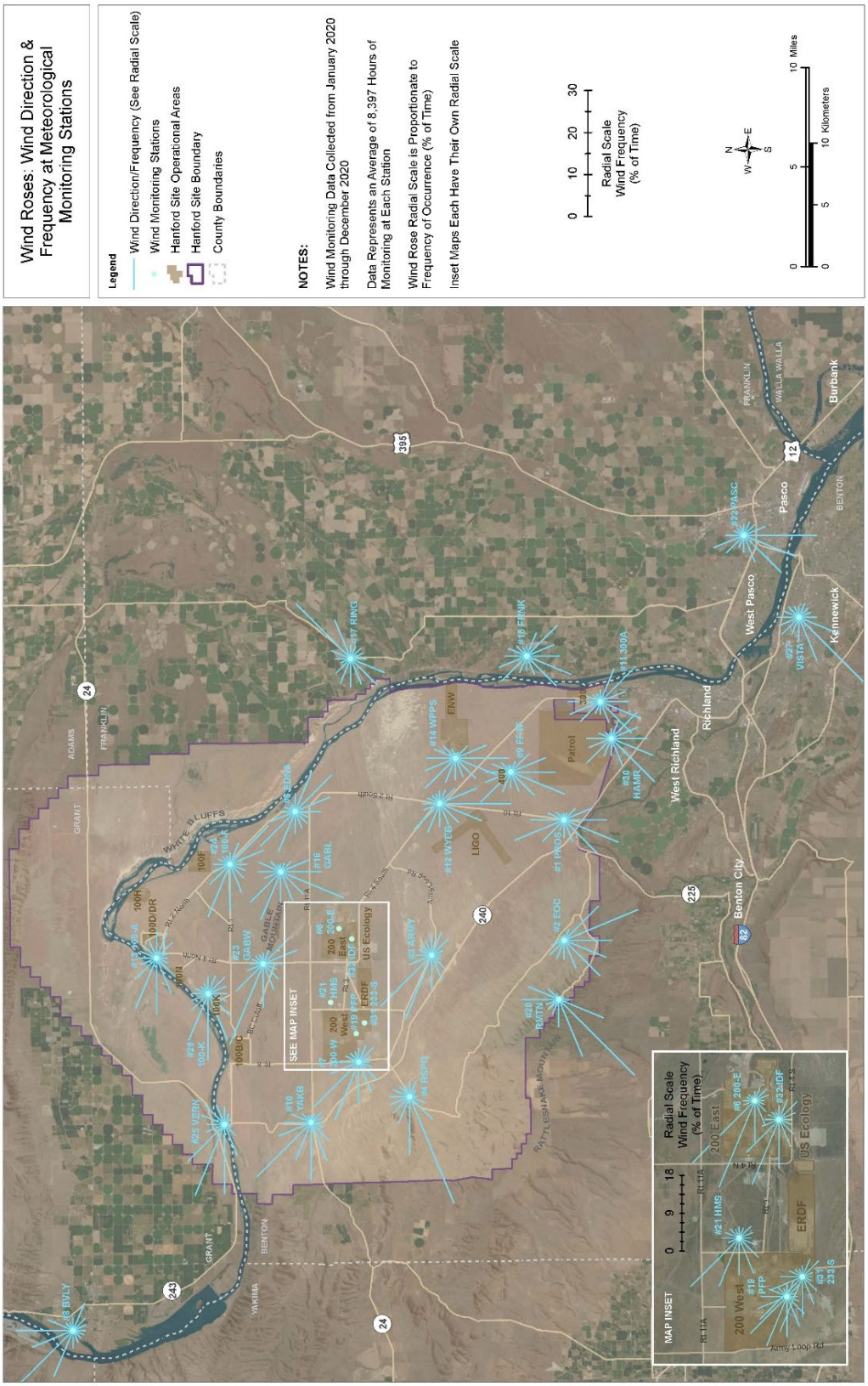

Figure 1-7. Meteorological Monitoring Network Wind Roses from 2020.
NOTE: Measured at a height of 30 ft (9 m).

Atmospheric dispersion is a function of wind speed, wind duration and direction, atmospheric stability, and mixing depth. Dispersion conditions are generally good if winds are moderate to strong, the atmosphere is of neutral or unstable stratification, and there is a deep mixing layer. Good dispersion conditions associated with neutral and unstable stratification exist approximately 57% of the time during summer. Less favorable conditions may occur when wind speed is light and the atmospheric dispersion-mixing layer is shallow. These conditions are most common during winter when moderate to extremely stable stratification exists (approximately 66% of the time). Occasionally, there are extended periods of poor dispersion conditions, primarily during winter, that are associated with stagnant air in stationary high-pressure systems.

1.6.1 Historical Climatological Information

Records and averages for a wide range of climatological information have been kept since Hanford Meteorology Station's inception. Table 1-1 shows the climatological information for the Hanford Meteorological Station from 1945 through 2020.

Table 1-1. Hanford Meteorology Station Climatological Information for 1945 through 2020.

	Normal annual average	Highest monthly average	Lowest monthly average	Record highest monthly average	Record lowest monthly average	Highest daily	Lowest daily
Temperature °F (°C)	54.3 (12.4)	77.0 (25.0)	31.5 (-0.3)	82.8 (28.2)	12.1 (-11.1)	113 (45)	-23 (-31)
Relative Humidity %	55.3	80.6	32.7	90.5	21.9	100	6
Precipitation in. (cm)	7.15 (18.16)	–	–	12.31 (31.23)[a]	2.99 (7.59)[a]	2.21 (5.6)	–
Snowfall in. (cm)	–	–	–	56.1 (142.5)[b]	0.3 (0.8)[b]	11.4 (28.9)	–
Wind Speed mph (m/s)	7.8 (3.5)	9.2 (4.1)	6.0 (2.7)	11.1 (5.0)	2.9 (1.3)	33.7 (15.1)	0.3 (0.1)
Pressure in./Hg (mb)	29.210	29.319	29.129	29.638	28.999	31.12 (1053.8)	28.86 (977.3)

[a] Precipitation records are for a year
[b] Snowfall records are for a season
– = Not reported

Daily and monthly averages and extremes of ambient temperature, dew point temperature, wet bulb temperature, pressure, wind, precipitation, sky cover, fog, solar radiation, relative humidity, thunderstorms, and other miscellaneous weather phenomena for 1945 through 2004 are reported in PNNL-15160, *Hanford Site Climatological Summary 2004 with Historical Data.*

1.6.2 Meteorological Monitoring

The average temperature for 2020 was 55.8 °F (13.2 °C), which was 1.5 °F (0.8 °C) above normal. During 2020, 11 months were warmer than normal and only 1 month (March) was cooler than normal. January had the greatest positive departure at 5.5 °F (3.1 °C) above normal and March had the largest negative departure at 0.2 °F (0.1°C) below normal.

Precipitation totaled 4.07 in. (10.34 cm), which is 57% of normal precipitation (7.14 in. [18.14 cm]). Greatest monthly total of precipitation was 0.99 in. (2.51 cm) in January and lowest monthly total was 0.00 in. (0.00 cm) in July. January 22 and 23 had the greatest 24-hour precipitation at 0.30 in. (0.76 cm). Snowfall for 2020 totaled 5.7 in. (14.5 cm), which was 37% of normal (15.3 in. [38.6 cm]).

Average wind speed was 8.8 mph (3.9 m/s), which was 1.0 mph (0.45 m/s) above normal. This ties the highest average annual wind speed, tied with 1999. Occurring on August 16, the peak gust for the year was 55 mph (24.6 m/s).

The growing season was 187 days in 2020. This made 2020's growing season below the normal of 184 days. The last frost in spring was April 17, and the first frost in fall was October 22. The longest growing season was 2016 at 235 days. The shortest growing season was 1974 at 142 days.

Monthly and annual climatological data collected at the Hanford Meteorology Station is provided in Table 1-2. Real-time and historical data from the Hanford Meteorology Station are available at http://www.hanford.gov/hms, which includes hourly weather observations, 15-minute data, monthly climatological summaries, and historical data.

1.7 Stakeholder Involvement

JR Draper

DOE encourages information exchange and public involvement in discussions and decision making regarding Hanford Site cleanup and remediation actions. Participants help guide cleanup decisions and post-cleanup outcomes, these participants include the public; Indian Tribes; federal, state, and local government agencies; advisory boards; activist groups; and other entities in the public and private sectors. The roles and involvement of select stakeholders are described in the following sections.

1.7.1 Role of Native American Tribes

G Phillips

The role of Indian Tribes at the Hanford Site is guided by DOE O 144.1, *Department of Energy American Indian Tribal Government Interactions and Policy*, which communicates departmental, programmatic, and field responsibilities for interacting with American Indian governments. DOE O 144.1 incorporates policy and consultation guidance in working with Indian Tribes. DOE will consult with any American Indian or Alaska Native Tribal governments with regard to any property to which that Tribe attaches religious or cultural importance and that might be affected by a DOE action. The policy outlines the trust relationship that DOE has with Indian Tribes and commits the agency to institute government-to-government relations with the Tribes. DOE O 144.1, Attachment 3, "Office of Environmental Management, Office of Nuclear Energy, Office of Science, and the National Nuclear Security Administration Framework to Provide Guidance for Implementation of DOE's American Indian and Alaska Native Tribal Government Policy," provides additional guidance on how Tribal consultation is to be conducted.

Table 1-2. Meteorology Station[a] Monthly and Annual Climatological Data 2020.

Month	Temperature (°F)								Precipitation (in.)				Relative Humidity (%)		15-m Wind[b]				
	Averages				Extremes						Snowfall						Peak Gusts		
	Daily Maximum	Daily Minimum	Monthly	Departure[c]	Highest	Date	Lowest	Date	Total	Departure[c]	Total	Departure[c]	Average	Departure[c]	Average Speed (mph)	Departure[c]	Speed (mph)	Direction	Date
Jan	46.7	31.0	38.8	+5.4	65	31	10	14	0.99	+0.05	1.2	-3.8	75.3	-5.8	9.4	+3.1	49	SSW	31[d]
Feb	53.0	29.6	41.3	+3.1	66	28	20	20	0.09	-0.61	T	-2.8	59.1	-11.4	8.6	+1.7	51	WSW	23
Mar	57.9	34.0	46.0	-0.5	68	20	21	17	0.52	-0.50	1.4	+0.9	51.1	-6.1	9.1	+1.2	43	SW	30
Apr	70.3	40.3	55.3	+1.8	83	29	22	3	0.03	-0.52	0	0	38.9	-9.3	9.4	+0.9	45	W	27[d]
May	77.5	49.5	63.5	+1.4	97	29	33	4[d]	0.50	-0.01	0	0	42.2	-1.1	9.9	+1.1	55	WSW	30[d]
Jun	84.5	56.0	70.3	+0.7	102	26	45	14	0.49	-0.02	0	0	38.5	-0.9	11.1	+2.1	48	NW	27
Jul	94.2	62.6	78.4	+1.3	111	30	54	1	0.00	-0.23	0	0	29.7	-2.9	9.7	+0.7	44	WNW	6
Aug	93.7	61.7	77.7	+1.9	109	17	50	13	0.01	-0.17	0	0	29.4	-5.3	9.0	+1.0	55	SSW	16
Sep	83.4	52.8	68.1	+1.7	99	6[d]	42	28	0.18	-0.13	0	0	44.0	1.4	7.1	-0.2	50	SSW	25
Oct	68.3	41.2	54.7	+1.6	89	6	19	26[d]	0.17	-0.32	T	+T	49.8	-7.4	8.2	+1.5	52	WSW	13
Nov	50.9	31.5	41.2	+0.7	74	4	20	9	0.57	-0.38	T	-1.5	73.0	-1.5	8.3	+1.6	47	SSE	13
Dec	40.2	27.3	33.8	+2.7	62	21	14	3	0.52	-0.68	3.1	-0.9	84.5	3.2	5.6	-0.3	48	S	21[d]
Year[e]	68.4	43.1	55.8	+1.5	111	Jul 30	10	Jan 14	4.07	-3.08	5.7	-8.7	51.3	-3.9	8.8	+1.0	55	WSW	May 30

Note: Refer to Appendix A, Table A.2, for unit conversion information.

[a] The Hanford Meteorology Station is 25 mi (40 km) northwest of Richland, Washington, at latitude 46°34'N, longitude 119°35'W, elevation 733 ft (223 m).

[b] Measured on a tower 50 ft (15 m) above ground.

[c] Departure columns indicate positive or negative departure of meteorological parameters from 30-year (1981–2010) climatological normal.

[d] Latest of multiple occurrences.

[e] Yearly averages, extremes, and totals

The U.S. government has a unique political and legal relationship with Tribal governments as defined by treaties, the U.S. Constitution, court decisions defining the federal trust responsibility, and executive orders. Additional federal laws and regulations requiring DOE to consult with Indian Tribes on certain issues include the *American Indian Religious Freedom Act of 1978*, the NEPA, *Archaeological Resources Protection Act of 1979*, *National Historic Preservation Act of 1966* (NHPA), and the *Native American Graves Protection and Repatriation Act of 1990*.

As Hanford Site cleanup progresses, Indian Tribes review various aspects of cleanup activities, including how these activities will affect cultural, natural, and biological resources.

DOE works primarily with The Nez Perce Tribe, Confederated Tribes of the Umatilla Indian Reservation (CTUIR), and Confederated Tribes and Bands of Yakama Nation (Yakama Nation), all of with whom the U.S. government negotiated treaties in 1855 (*Treaty with The Nez Percés* [U.S. Government 1855a]; *Treaty of Walla Walla* [U.S. Government 1855b]; *Treaty with The Yakama* [U.S. Government 1855c]). Each treaty included provisions that reserved the rights of Indian Tribes to fish at all usual and accustomed places, hunt, gather roots and berries, and pasture horses and cattle on open and unclaimed land, among other rights. Located in Priest Rapids, the Wanapum, who once resided on lands that are now the Hanford Site with historic ties to the area, has a long-standing relationship with DOE. Additionally, DOE provides financial assistance through cooperative agreements with the Nez Perce Tribe, CTUIR, and Yakama Nation and supports Tribal involvement in decisions made at Hanford. Funding enables Indian Tribes to retain staff to facilitate reviews and comment on site-related draft documents and plans, as well as participate in meetings and activities. Tribal experts in tribal culture, history, and resources often contribute their insight and expertise to Hanford Site decision-making processes and activities. Further information regarding the DOE Tribal Program is available at http://www.hanford.gov/page.cfm/inp.

1.7.1.1 2020 Activities

DOE-RL continued to interact with the Tribes regarding Tribal access and use of the Hanford Site. In August 2019 DOE–RL established the Hanford State and Tribal Government Working Group (HSTGWG) meeting. The HSTGWG is focused on Hanford Site Cleanup, Long-Term Stewardship activities, and Tribal program activities. HSTGWG members are DOE-RL, DOE-ORP, EPA, Ecology, State of Oregon, CTUIR, Nez Perce Tribe, Confederated Tribes and Bands of the Yakama Nation, and Wanapum Band of Indians. The HSTGWG is held twice a year in advance of the Environmental Management State and Tribal Government Working Group.

As part of mitigations agreed upon with the Nez Perce, CTUIR, and Wanapum for the transfer of land out of federal control, DOE and the Tribes finalized Tribal revegetation and/or rehabilitation projects to lands within documented Traditional Cultural Properties.

The Tribal Program also conducted several annual events, including:

- Tribal training for DOE and Contractor managers
- HAMMER Tribal Subcommittee participation
- Participation in the bi-annual HSTGWG, the annual Environmental Management Tribal Leader Dialogue, and the Hanford Tribal Leaders Dialog

- Drafted a Site Implementation Plan to implement DOE O 144.1 at the Hanford Site.

1.7.2 Cultural and Historic Resource Consultations

K Mendez

The NHPA requires federal agencies to consult with Indian Tribes, the Advisory Council on Historic Preservation, State Historic Preservation Officers, local government representatives, and the interested public on cultural and historic resource matters. The NHPA implementing regulations (36 CFR 800) require that DOE consider the effect of its actions on historic properties in consultation with consulting parties. DOE-RL solicits and gathers input from Indian Tribes, interested parties, and the Washington State Historic Preservation Officer to identify and evaluate cultural and historic resources within its areas of potential effect. DOE-RL assesses the impacts of its activities on significant resources and seeks concurrence with the Washington State Historic Preservation Officer.

DOE-RL's Cultural and Historic Resource Program, implemented by MSA staff for DOE-RL, consults with the Washington State Historic Preservation Officer, the Yakama Nation, the CTUIR, the Nez Perce Tribe, and the Wanapum through monthly and individual meetings and discussions, archaeological fieldwork, and project comment resolution. Tribal cultural experts discuss project scope and design on a monthly basis with DOE-RL, the State Historic Preservation Officer, Tribal representatives, and other interested parties.

The Program also consults with other parties that express an interest in cultural and historic resources located on the Hanford Site, including groups such as the Benton County Historical Society, East Benton County Historical Museum, the Franklin County Historical Society and Museum, and the Reach Museum.

The DOE/RL-98-10, *Hanford Cultural Resources Management Plan*, provides guidance on cultural and historic resources, cultural materials, and archaeological resources. The Plan also contains guidance on consultation in accordance with other statutes including, but not limited to, the *Native American Graves Protection and Repatriation Act* and the *Archaeological Resources Protection Act of 1979*.

DOE P 141.1, *Department of Energy Management of Cultural Resources*, ensures that DOE-RL integrates cultural resources management into its mission and activities. Consultation with affected stakeholders is pivotal to maintaining the cultural and historical values associated with identified cultural resources for future generations and implementing all stewardship responsibilities.

1.7.2.1 2020 Activities.

In 2020, the Cultural and Historic Resources Program conducted NHPA reviews for 48 proposed projects. DOE-RL hosted 11 monthly meetings with Tribal representatives, 9 of which were virtual. As a result of the response to the Coronavirus Disease 2019 (COVID-19), activities performed by the Cultural and Historic Resources Program were limited. Fewer projects requiring NHPA compliance reviews were initiated and archaeological fieldwork was limited. Additionally, monthly meetings with the State Historic Preservation Office and consulting Tribes were moved to a virtual platform.

1.7.3 Hanford Natural Resource Trustee Council

TC Post

The *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) and implementing regulations in 40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency

Plan," establish DOE as both the CERCLA lead response agency at departmental facilities and a trustee for natural resources under its jurisdiction. As the lead response agency, DOE must conduct response actions to correct or mitigate threats to human health and the environment that result from the release of hazardous substances during the execution of its assigned missions. CERCLA also provides authority for assessment and restoration of natural resources that have been damaged by a hazardous substance release or response.

Under CERCLA, the United States is liable for damages or injury to, destruction of, or loss of natural resources resulting from release of hazardous substances or from removal or remedial activities made necessary because of such releases, including the cost of assessing such damage. The President of the United States by Executive Order 12580, "Superfund Implementation," appointed the Secretary of Energy as the primary trustee for all natural resources located on, over, or under DOE-administered land, including the Hanford Site.

Natural resource trustees are government officials who act on behalf of the public when there is injury to, destruction of, loss of, or threat to natural resources (for which they have management responsibility) from contaminant release. Federal, state, and Tribal entities are authorized to act as trustees pursuant to CERCLA Section 301(c), which covers Natural Resource Damage Assessments (NRDAs). Trustees for the Hanford Site include:

- DOE on behalf of the U.S. federal government
- U.S. Department of the Interior through the USFWS
- U.S. Department of Commerce through the National Oceanic and Atmospheric Administration
- State of Washington through Ecology in consultation with the WDFW
- State of Oregon through the Oregon Department of Energy
- Nez Perce Tribe
- CTUIR
- Yakama Nation.

Established in 1996 via a memorandum of agreement (MOA), the Hanford Natural Resource Trustee Council (Council) is a voluntary association of trust organizations. Members collaborate and coordinate on issues, documents, and actions concerning natural resources. The primary purpose of the Council is to facilitate the coordination and cooperation of the trustees in their efforts to mitigate effects to natural resources that result from either hazardous substance releases on the Hanford Site or remediation of those releases. The Council has adopted bylaws to direct the process of arriving at consensus on all substantive decisions. A revised MOA was approved by the Trustees in FY 2016 (DOE-RL 2016). The MOA supersedes the 1996 Hanford Site Trustee MOA.

1.7.3.1 2020 Activities

Hanford NRDA work in FY 2020 focused on continuing the FY 2019 injury assessment studies and work scope. No new studies were initiated in FY 2020. The Legal Work Group continued to meet and discuss the need for Trustees to retain NRDA expertise to progress the injury assessment.

The ongoing studies are based on the draft *Hanford Natural Resource Damage Assessment Injury Assessment Plan* (HNRT 2012) approved by the Council in 2013. The Council's goal is to complete the injury assessment and prepare a Restoration Plan by 2024. Implementation of the Injury Assessment Plan is a dynamic, iterative process and the list of studies is subject to change as additional data

becomes available during the injury assessment process. The Council continued to meet throughout the year to plan, organize, implement, and direct Hanford NRDA activities.

Council and project teams delivered project materials or technical updates for 10 assessment activities:

- Injury Thresholds for soil, sediment, and water
- Aquatic restoration planning
- Terrestrial habitat restoration planning
- Terrestrial disturbance inventory
- Terrestrial data compilation
- Groundwater to surface water evaluation statement of work
- Terrestrial and data analysis statement of work
- Sediment and pore water toxicity studies technical memo
- Administrative Record updates
- Uploading reports, references, geodatabases and documents to the Council's Data Management System (Project Portal).

Service loss studies are ongoing with each of the three Tribal trustee organizations represented on the Council. Information about the Council, including its objectives, history, and projects, is available online at http://www.hanford.gov/page.cfm/hnrtc.

1.7.4 Public Involvement in Hanford Site Decisions

JM Colborn

DOE-RL and DOE-ORP believe that public involvement is essential to the ultimate success of Hanford Site cleanup. Both field offices have staff members who coordinate, plan, and schedule public participation activities for DOE on the Hanford Site.

Previously known as the *Community Relations Plan*, the *Hanford Public Involvement Plan* (TPA 2017) serves as the overall guidance document for public participation and outreach activities at the Hanford Site. The document outlines the public participation processes used by the TPA agencies and offers ways in which the public can be involved in Hanford Site cleanup decision-making processes. The first plan was developed and approved with public input in 1990 and was last revised in June 2017. During calendar year 2020, the Hanford Site worked to the June 2017 Plan (TPA 2017).

A key goal of public involvement is to facilitate broad-based participation and obtain stakeholder and public perspectives on Hanford Site cleanup decisions. DOE uses various forums to inform the public about upcoming public involvement and participation opportunities including, but not limited to, the following:

- Listserv Notices and Printed Mailings. The TPA agencies use a Listserv to communicate electronically about upcoming public involvement activities along with information on ways to be involved in Hanford Site cleanup decisions. To be added to the electronic mailing list, visit the Listserv website (http://listserv.ecology.wa.gov/scripts/wa-ECOLOGY.exe?SUBED1=HANFORD-INFO&A=1) to subscribe or send an email to Hanford@ecy.wa.gov.

- Hanford Site Public Involvement Activities. Available at http://www.hanford.gov/pageAction.cfm/calendar, the Hanford Site events calendar provides an

overview of public involvement opportunities for the coming months and identifies current forums and emerging opportunities to inform and involve stakeholders and the public.

- TPA Agencies Public Involvement Calendar for the Hanford Site. Available on the Public Involvement Opportunities page on the Hanford Site website (https://www.hanford.gov/page.cfm/Outreach/PublicCommentOpportunities), a public involvement calendar is available that frequently provides upcoming key public activities including Hanford Advisory Board (HAB) meeting dates and locations.

- TPA Agencies Public Involvement Summary. Each year since the early 2000s, the TPA agencies have distributed an annual survey to encourage feedback from the public (including workers) about the Hanford Site cleanup public involvement opportunities. What began as a challenging, hand-written response interpretation and information gathering at biennial meetings has become an annual electronic survey. Among other lessons learned, the TPA agencies have used the feedback to improve printed communications materials and the structuring of public meetings. Previous years' public involvement summary reports can be found online at https://issuu.com/hanford_edoutreach.

- Hanford Site Informational Links. Information concerning Hanford Site events, issues, cleanup activities, and public involvement opportunities is available at http://www.hanford.gov/.

- Comment and Response Documents. Following a DOE or TPA public comment period, a comment and response document is developed to record public comments received on an issue. Comment and response documents are distributed to members of the public who provide comments or request a copy. These documents are also available at the DOE Public Reading Room (Washington State University Tri-Cities Consolidated Information Center, 2710 University Dr., Richland, Washington); on the TPA Administrative Record Public Information Repository website (http://pdw.hanford.gov/arpir/); and, for proposed changes to the TPA that underwent public comment, on the TPA website at http://www.hanford.gov/page.cfm/TriParty/ModificationsforPublicComment.

- Informational Public Meetings. All TPA quarterly public involvement planning, semiannual, and special meetings and workshops are open to the public. In addition, the TPA agencies welcome opportunities for co-sponsoring meetings organized by local, state, and federal agencies; Tribal governments; and citizen groups.

Hanford Site cleanup documents are also available to the public through the TPA Administrative Record Public Information Repository website (http://pdw.hanford.gov/arpir/). Responsible federal and state governments provide the public a variety of opportunities to offer input and influence Hanford Site cleanup decisions, including informal and formal public comment periods such as those described in Ecology et al. (2011a), CERCLA, *Resource Conservation and Recovery Act of 1976* (RCRA), and NEPA; HAB meetings; Hanford Site presentations; and other Hanford Site-related public involvement and information meetings, workshops, or activities.

For more information about Hanford Site cleanup activities, contact the TPA agencies at the following contact numbers:

DOE-RL	(509) 376-4171
DOE-ORP	(509) 376-4171
Ecology	(509) 372-7950
EPA	(509) 376-4919

For more information about Hanford Site public involvement, visit the Hanford Site website at http://www.hanford.gov.

1.7.5 State of Oregon

DC Gribble

DOE recognizes Oregon's unique role and interests at the Hanford Site and its concerns with protecting Columbia River resources. In 2017, DOE-RL and DOE-ORP updated a 2004 Memorandum of Understanding with the State of Oregon to consult and, when possible, cooperate on Hanford Site environmental issues. DOE consults with and includes the Oregon Department of Energy in planning and conducting Hanford Site-related public involvement activities in the State of Oregon.

1.7.6 Hanford Advisory Board

DC Gribble

The HAB is a broadly representative body consisting of a balanced mix of members that represent diverse interests affected by Hanford Site cleanup decisions. The TPA agencies created the HAB in 1994 and was ultimately chartered as one of eight environmental management site-specific advisory boards across the country. The HAB comprises 32 members and their alternates, including representatives from the Nez Perce Tribe, CTUIR, and the Yakama Nation. Current members with their affiliations are listed on the HAB website at https://www.hanford.gov/files.cfm/20200124_Membership_List.pdf.

The HAB assists the broader public in becoming more informed and meaningfully involved in Hanford Site cleanup decisions through its open public meetings. Board members' formal advice on cleanup issues reflects the values of its constituents. Copies of their advice and DOE's responses are on the HAB Advice and Responses website at http://www.hanford.gov/?page=453. Additional information about the HAB, including its charter (operating ground rules), is available at https://www.hanford.gov/page.cfm/hab.

In calendar year 2020 the HAB provided five pieces of advice to the TPA agencies. The advice and the TPA Agencies' responses may be found at: https://www.hanford.gov/page.cfm/hab/AdviceandResponses.

1.8 Hanford Site Regulatory Oversight

JR Draper

Several federal, state, and local regulatory agencies are responsible for monitoring and enforcing compliance with applicable environmental regulations at the Hanford Site, including the EPA, Ecology, Washington State Department of Health, and the Benton Clean Air Agency. The EPA and Ecology are the

two main agencies who regulate Hanford Site cleanup as part of the TPA. In addition, the Defense Nuclear Facilities Safety Board (DNFSB) provides oversight of DOE work. See Section 2.0 for more detail on the oversight at the Hanford Site.

1.8.1 Hanford Federal Facility Agreement and Consent Order

SW Davis, SL Brasher

The TPA is an agreement (Ecology et al. 2011a) among the TPA agencies to achieve compliance on the Hanford Site with the CERCLA remedial action provisions and RCRA TSD unit and corrective action regulations. The TPA is an interagency agreement under CERCLA Section 120, a corrective action order under RCRA, and a consent order under the RCW 70.105, "Hazardous Waste Management," that:

- Defines RCRA and CERCLA cleanup commitments
- Establishes responsibilities
- Provides a basis for budgeting
- Reflects a concerted goal to achieve regulatory compliance and remediation with enforceable milestones.

Attachment 2 is the Action Plan of the TPA, which describes how to implement the cleanup and permitting efforts; this includes milestones (TPA Appendix D) for initiating and completing specific work and procedures the TPA agencies will follow (Ecology et al. 2011b).

The TPA has evolved as Hanford Site cleanup has progressed. Since its initial publication in 1989, the TPA agencies have negotiated changes to the agreement to meet the changing conditions and needs of cleanup activities on the Hanford Site. All significant changes undergo a process of public involvement designed to enhance communication and address public concerns prior to final approvals. Revision 8 of the TPA was published in July 2011 (Ecology et al. 2011a). As new change control forms are approved through the TPA change control process, they are incorporated into the TPA. Electronic copies of Revision 8 of the TPA are publicly available online and can be viewed at https://www.hanford.gov/page.cfm/TriParty/TheAgreement. For additional TPA information or questions, call the Washington State Department of Ecology, Nuclear Waste Program office at (509) 372-7950 or e-mail to Hanford@ecy.wa.gov.

1.8.1.1 TPA Milestone Status

The TPA commits DOE to comply with the remedial action provisions of CERCLA, as well as with RCRA TSD unit regulations and corrective action provisions, including Washington State's implementing regulations (WAC 173-303, "Dangerous Waste Regulations").

From 1989 through December 31, 2020, a total of 1,367 TPA milestones were completed and 345 target dates were met. During 2020, 21 specific cleanup milestones were scheduled for completion; of those, 19 milestones were completed on time, 1 milestone was being disputed, 3 milestones were in negotiations, and 0 milestones were deleted. In addition, two target dates were met, two target dates were in negotiation, and zero target dates were deleted or disputed.

1.8.1.2 TPA-Approved Modifications

During 2020, 17 negotiated change control forms to the TPA were approved and can be viewed on the TPA website at http://www.hanford.gov/c.cfm/tpa/.

1.8.2 Defense Nuclear Facilities Safety Board

JR Draper

Congress created the DNFSB as an independent agency within the Executive Branch to identify the nature and consequences of potential threats to public health and safety at DOE's defense nuclear facilities, to elevate such issues to the highest levels of authority, and to inform the public. During 2020, the DNFSB oversaw projects pertaining to each contractor at the Hanford Site (e.g., COVID-19, Double-Shell Tank Safety, deactivation and decommissioning of the Plutonium Finishing Plant, Building 324 Preparatory Work for Remote Soil Excavation, WTP. Reports produced by the DNFSB reporting on Hanford Site projects can be viewed at https://www.dnfsb.gov/documents.

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